COMPARATIVE STUDY OF THE USE OF EPSDT AND OTHER PREVENTIVE AND CURATIVE HEALTH CARE SERVICES BY CHILDREN ENROLLED IN MEDICAID: FINAL PROJECT SYNTHESIS REPORT

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1 Introduction

The Early Periodic Screening, Diagnosis and Treatment (EPSDT) program is an ambitious pediatric component to the Medicaid program. Established in 1967, EPSDT provides comprehensive, periodic evaluation of health, developmental, and nutritional status, as well as vision, hearing, and dental screening services, to all Medicaid-enrolled children from birth to 21 years of age. The program also provides services necessary to correct health problems identified through the evaluation and screening services. The primary goal of the program is to detect correctable conditions early so that more serious health problems and more costly health care services can be avoided.

However, since its inception, the program's success in screening and treating eligible children has fallen short of expectations. These shortfalls are caused by a variety of factors—many of which relate to the health care-seeking behavior of Medicaid children and their guardians and to the structure of the medical system they must access. Others relate to program factors, such as insufficient outreach, inadequate provider participation, and variable coverage across the States of both screening and treatment services. For example, prior to 1989, States were required to cover only diagnostic and treatment services that were mandatory for all Medicaid-eligible persons; therefore, some services, such as physical or occupational therapy required for treatment of certain conditions discovered during a screen, were not covered in some States and were limited in number and/or duration in other States. States were also allowed to set eligibility requirements for providers of EPSDT screens. Some States restricted these services to public health centers or providers who were able to demonstrate the ability to provide all mandatory screening services in one location. These restrictions reduced the availability of services to many Medicaid children.

To increase EPSDT participation and to improve children's health status, Congress included several provisions in the Omnibus Budget Reconciliation Act of 1989 (OBRA-89) that address many of these problematic program factors. This report synthesizes the findings of a four-year study funded by the Health Care Financing Administration (HCFA) that investigated the impacts of these provisions on children's health service use and expenditures.

1.1 Legislative Background

Each year from 1984 through 1990, Congress enacted legislation expanding both mandates and options for Medicaid eligibility of children (Gavin, 1992). The new laws addressed both the financial and categorical eligibility requirements of the program. States are now required to use separate income thresholds for Medicaid eligibility for children from those used for the cash assistance programs and to cover all children meeting the financial requirements, regardless of family structure. By 1990, States were required to cover all children born after September 30, 1983 in families with incomes below the Federal poverty level (FPL) and children under six years of age in families with incomes up to 133 percent of the FPL. States could optionally cover pregnant women and infants in families with incomes up to 185 percent of the FPL and children born on or before September 30, 1983 up to age 21 years in families with incomes up to the State's Aid to Families with Dependent Children (AFDC) income eligibility level or, if the State has a medically needy program, up to the medically needy income limit. The legislative initiatives also permitted States to drop asset tests and to disregard other financial resources in determining Medicaid eligibility for pregnant women and children.

In addition, the legislative initiatives sought to broaden and strengthen the benefits that children receive through Medicaid. These initiatives addressed both preventive care and illness- and disability-related services. In particular, OBRA-89 required States to make screening services available to children not just at periodic intervals but whenever a child is suspected of having a physical, mental, or developmental problem or condition that requires an assessment, further diagnosis, or treatment. The law also required States to provide all medically necessary services eligible for Federal financial assistance to children whose periodic or interperiodic screens reveal problems, even if the services are not otherwise covered under the State's Medicaid plan. In addition, OBRA-89 codified regulations to require that screening, vision, hearing and dental services be provided at intervals that meet "reasonable standards of medical and dental practice"; mandated States to develop distinct periodicity schedules for routine health, vision, hearing, and dental screens; required States to screen all children ages one to five years and others at risk for lead poisoning; and placed renewed emphasis on the provision of health education and anticipatory guidance in screening visits.

OBRA-89 also addressed incentives for provider participation in Medicaid. States are generally required to set reimbursement rates for Medicaid-covered services at levels that ensure comparable service availability to that of the general population within the same geographic area; to guarantee compliance with the law, OBRA-89 codified this provision for obstetrical and pediatric services. This provision of OBRA-89 is often referred to as the "equal access" provision. Furthermore, OBRA-89 allowed qualified practitioners who provide less than the full set of screening, diagnosis, and treatment services to participate in the EPSDT program. These amendments were intended to encourage a larger number of pediatricians and more specialists, such as developmental psychologists, to participate in EPSDT.

Furthermore, OBRA-89 established Federal authority to set State-specific performance standards for the EPSDT program. In response to this latter provision, the Secretary of the Department of Health and Human Services (DHHS) set a goal of 80 percent participation in EPSDT among all eligible Medicaid children by fiscal year (FY) 1995. To accomplish this goal, States were expected to reduce the difference between their annual participation rate and the 80 percent goal by one-fifth each year from FY 1990 to FY 1995.

1.2 Objectives and Methodology

This study investigated the impact of the OBRA-89 provisions on the EPSDT programs and the health status, service use, and expenditures of Medicaid children in four States—California, Georgia, Michigan, and Tennessee. Initially, the study had four major components: (1) case studies of the four States to determine how they operate their EPSDT programs and how program policies changed as a result of the OBRA-89 legislation; (2) a pre-post analysis of children's Medicaid utilization and expenditures using claims data for 1989 (the year before OBRA-89 was adopted) and 1992 (the first year in which the OBRA-89 provisions were fully implemented); (3) a pre-post analysis of the supply of child health providers participating in Medicaid and EPSDT also using claims data for 1989 and 1992; and (4) an analysis of national survey data to determine how the health status and health care utilization and expenditures of Medicaid children differed from those of other children in the United States both prior to and following OBRA-89. A fifth component of the study subsequently was added to measure participation among dental providers for Medicaid children in the four study States and to investigate the impact of dental provider supply on Medicaid children's use of dental services. We also used a pre-post design and Medicaid claims data for these analyses.

The study addressed numerous questions surrounding how the four States changed their Medicaid programs in response to the OBRA-89 provisions relating to children and the impact these changes had on children's health service use and expenditures. In particular, we investigated the following questions:

- How did the four States change their eligibility requirements for children , and what impact did these changes have on the number and the composition of enrolled children?
- How did the four States change provider participation requirements and reimbursement levels, and what impact did these changes have on provider participation and children's access to care?
- How did the four States change the provision of preventive care under Medicaid in general and EPSDT screening services in particular, and what impact did these changes have on the percentage of children with any preventive care and the percentage of children in compliance with national standards on preventive care for children?
- How did the four States change covered services for children in their Medicaid programs, and how did this impact the types of problems for which children were referred for further diagnosis and treatment and the number and types of services children utilized?
- How did all of these changes in eligibility, benefits, and provider incentives impact expenditures for Medicaid-covered services among children?
- How did the use of preventive and curative health care services by Medicaid children compare to that of privately insured and uninsured children in low-income and middle-to-high-income families and how did these comparisons change after implementation of the OBRA-89 provisions?

This report is a synthesis of our findings. We first present a description of the Medicaid programs in the four study States and the States' responses to the OBRA-89 provisions relating to children's Medicaid coverage and the EPSDT program. In the following two sections, we present the results of our analyses of the impact of these responses on participating providers and enrolled children, respectively. We then put these results into a national context by reviewing the results of the national survey data analyses in the next section. Finally, we draw all this information together to answer each of the questions posed above in the concluding section.

2 Description of State Programs and The Implementation of OBRA-89

The four study States—California, Georgia Michigan and Tennessee—were chosen for this study because of the ready availability of their Medicaid claims data.[1] Although these States are not necessarily representative of all State Medicaid programs, they are among the largest, both in terms of total recipients and total expenditures (Herz et al., 1995). In 1989 and 1992, these four States together accounted for about one-quarter of all Medicaid recipients and 17-18 percent of total Medicaid expenditures. California with the largest State Medicaid program nationwide accounted for the majority of these recipients (60-62 percent) and expenditures (57 percent).

This report focuses on Medicaid enrollees under 21 years of age who were not enrolled in either Medicare or a Medicaid capitated program and who had not resided in a long-term care or other medical institution during the study year. These children constituted an increasing majority of Medicaid recipients; in the four study States, they represented 53-59 percent of the Medicaid population in 1989 and 55-60 percent in 1992. Georgia experienced the greatest increase in this Medicaid child population between 1989 and 1992 at 66 percent, followed by Tennessee at 47 percent and California at 42 percent. In Michigan, this population remained relatively stable with a growth rate of only 4 percent.[2] Although they comprised a majority of the recipient population, these children accounted for only 19-28 percent of total Medicaid expenditures in 1992.

The study States differed in significant ways, both with regard to their Medicaid coverage for children and their EPSDT programs. These differences led to differential responses to the OBRA-89 provisions.

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[1] The primary data source for the four-State analyses was the Tape-to-Tape database. This database includes all claims. enrollment, and provider data from the Medicaid Management Information Systems in these States from 1980 through 1992. The claims and enrollment data were put into uniform format by The MEDSTAT Group under a series of contracts from HCFA.

[2] One reason why Michigan's rate of increase in this population is so low is the exclusion of children in Medicaid capitated plans. However, the inclusion of these children only increases the growth rate to 13 percent—still well below the rates in the other three study States.

2.1 Eligibility Requirements

The study States' pre-expansion financial eligibility standards ranged from the highest to among the lowest in the nation. California had the highest AFDC income threshold in the continental United States in 1989 and was second only to Vermont in 1992; California's medically needy income threshold was the highest among the States and territories in both years. However, the income standards in California were unchanged from 1989 to 1992. Therefore, the State's AFDC income threshold for a family of three expressed as a percent of the FPL fell from 85 percent to 72 percent over the study period. Similarly, the medically needy income threshold for a family of three in California fell from 113 percent of the FPL in 1989 to 97 percent of the FPL in 1992.

The income standards were lower in the other three States. In 1989, the AFDC income threshold expressed as a percent of the FPL was 70 percent in Michigan, 50 percent in Georgia, and 47 percent in Tennessee , and the medically needy income thresholds were 67 percent, 45 percent, and 30 percent in the three States, respectively. Michigan, which had a poor economy and State budget crisis in 1991, actually reduced its income thresholds for the AFDC program. However, the other two States increased their income thresholds during the study period. The AFDC and medically needy income thresholds increased slightly over 2 percent in Georgia from 1989 to 1992, and Tennessee, which had the lowest income standards in 1989, increased its AFDC income threshold by 10 percent but made no changes in its medically needy income threshold. Nevertheless, none of the Medicaid eligibility thresholds in the four States kept pace with the increase in the FPL (Table 1).

The implementation of the poverty-related expansions also varied in timing and extent among the study States. Tennessee was one of the first States to take advantage of the 1987 Omnibus Budget Reconciliation Act (OBRA-87) expansion coverage option for pregnant women, infants, and young children. Because its income thresholds for Medicaid were already near the poverty level, California did not move as quickly as other States to exercise the OBRA-87 Medicaid expansion options for children. By 1989, Tennessee covered children under age seven with family incomes up to 100 percent of the FPL; Georgia covered children under age three living below the FPL; and Michigan covered infants in families with incomes up to 185 percent of the FPL and children under age three in families with incomes up to 100 percent of the FPL. In July 1989, California chose to extend Medicaid to pregnant women and infants with family incomes up to 185 percent of the FPL, but the State had not exercised the option to extend Medicaid to older children.

By 1992, all four States covered children up to age six who were living below 133 percent of the FPL, and all other children born after September 30, 1983 in families with incomes up to 100 percent of the FPL, as mandated in OBRA-90. In addition, all study States, except Georgia, covered infants in families with incomes up to 185 percent of the FPL in 1992; Georgia covered infants living below 133 percent of the FPL.

Table 1. Selected Medicaid Income Eligibility Thresholds as a Percent of the Federal Poverty Level

	California	Georgia	Michigan	Tennessee
1989				
AFDC	85	50	70	47
Medically needy	113	45	67	30
Pregnant women and infants	185	100	185	100
Children up to 3 years	—	100	100	100
Children aged 3-6 years	—	—	—	100
1992				
AFDC	72	44	57	44
Medically needy	97	39	59	26
Pregnant women and infants	185	133	185	185
Children up to 6 years	133	133	133	133
Children aged 6-9 years	100	100	100	100

The new eligibility criteria changed the composition of the Medicaid child population. Medicaid children were younger on average: 47 to 53 percent of Medicaid children in the four study states were under age seven in 1992 compared to 43 to 46 percent in 1989 (Herz et al., 1996). In three of the study States, a higher percentage of Medicaid children were white in 1992 compared to 1989; California experienced a disproportionately small increase in the percentage of children classified as white during the study period. In addition, for the three States for which we had data, we found greater percentages of Medicaid children living in inner city counties of urban areas in 1992 compared to 1989. Unfortunately, claims data do not have information on family composition. However, using data from the National Health Interview Surveys (NHIS), we also found that greater percentages of Medicaid children lived in households with both parents in 1991 compared to 1988 (Gavin and Bencio, 1996a).

Furthermore, a greater proportion of the child population was disabled in 1992 compared to 1989; the number of children covered by Medicaid because of receipt of Supplemental Security Income (SSI) payments rose 50 to 79 percent in the four study States. These increases are at least partly a result of a Supreme Court decision in 1990 (*Sullivan vs. Zebley*, February 20, 1990) that found the Social Security Administration (SSA) had been using a harsher disability test for children applying to the SSI program than Congress had intended; the court ordered SSA to assess each child against age-appropriate functional standards. Although SSI recipients only comprise 2 to 4 percent of the Medicaid child population, they account for a disproportionately large share of Medicaid expenditures because of their higher medical needs.

Finally, almost a quarter of the growth in Medicaid child enrollees in California (201,298 children) was the result of enrollment of undocumented aliens; undocumented aliens accounted for 3.5 percent of the Medicaid child population in California in 1989 and 9 percent in 1992. Medicaid coverage for these children was limited to broadly defined emergency services, including emergency room visits, prescription drugs, inpatient care, follow-up visits, and any other services necessary to alleviate a medical condition that poses an immediate health threat or would seriously impair on-going health.[3] These children were not eligible for EPSDT or other preventive care services under the Medicaid program, although they may have had a few such services—e.g., immunizations. Unfortunately, we were not aware of the limited coverage for these children until after the project was completed, and therefore, we were not able to account for any impact they may have had on the utilization and expenditure data.

2.2 Provider Fee Schedules and Participation Requirements

Perhaps the most important provision of the OBRA-89 legislation affecting providers was the equal access provision, which requires States to set payment rates to providers at levels that ensure the availability of obstetric and pediatric services for Medicaid recipients is comparable to that of the general population within the same geographic area. All of the study States were able to show HCFA that they currently meet this requirement by providing data on physician participation.

However, when we compared Medicaid fees to fees for a selected set of services paid to physicians for privately insured children in the same State using the MEDSTAT MarketScan database, we found Medicaid fees were significantly lower than private fees in all four study States. In 1989, the index of Medicaid-to-private payment levels for a set of representative services ranged from a low of 0.35 in California to a high of 0.62 in Georgia (Table 2). Another index for a subset of preventive care services had a narrower range but presented a similar picture—the index ranged from a low of 0.45 in Georgia to a high of 0.51 in Tennessee.

Only Michigan and Tennessee raised Medicaid fees for medical providers during the study period. We found the weighted average increase in Medicaid fees for the representative set of services to be 23 percent in Michigan and 10 percent in Tennessee; for the set of preventive care services, the increase was 50 percent in Michigan and 9 percent in Tennessee.[4] Nevertheless, the Medicaid-to-private fee index for the representative set of services remained constant in Michigan, where fee increases in the private sector matched the Medicaid fee increases. The Medicaid-to-private fee index improved slightly (6 percent) in both Tennessee and California and fell somewhat (8 percent) in Georgia from 1989 to 1992 (Adams et al., 1996b). The improvement in California resulted from declining private fees. Michigan was the only State in our study in which the Medicaid-to-private fee index for preventive care services increased (17 percent) from 1989 to 1992; it declined in the three other States (4 percent in California, 6 percent in Tennessee, and 11 percent in Georgia).

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[3] This information was obtained in discussions between Lisa Herz from The MEDSTAT Group and Maura Donovan from the State of California on December 6, 1996 and was verified with the Medi-Cal Provider Manuals. The extent of Medicaid service use among these children is unknown.

Table 2. Index of Medicaid-to-Private Payment Levels by Type of Service

	Representative Services[1]		Preventive Care Services[2]	
	1989	1992	1989	1992
California	0.35	0.37	0.47	0.45
Georgia	0.62	0.57	0.45	0.40
Michigan	0.45	0.45	0.48	0.56
Tennessee	0.54	0.57	0.51	0.48

[1] The set of services representative of those typically billed under Medicaid include procedures for which at least 20 claims were found in both the MarketScan and Medicaid claims data files; 58 such procedures were included in the California index, 43 in the Georgia index, and 48 in both the Michigan and Tennessee indexes. These procedures are listed in Appendix A of Adams et al. (1996b).

[2] The set of preventive care services is a subset of the procedures included in the set of representative services; 15 such procedures were included in the California index, 5 in the Georgia index, 10 in the Michigan index, and 8 in the Tennessee index. These procedures are listed in Appendix A of Adams et al. (1996b).

Fees for dental services increased significantly in both Michigan and California during the study period. In Michigan, fees rose 22 to 39 percent depending on the procedure while in California some dental fees more than doubled. Nevertheless, they remained quite low compared to private sector fees. In Georgia, there were a few small fee increases and, in Tennessee, there were no changes in dental fees from 1989 to 1992.

The study States implemented several other notable strategies to increase the base of providers participating in EPSDT after the passage of OBRA-89 (Adams et al., 1996b; Hill and

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[4] Both Georgia and Michigan implemented Resource Based Relative Value Scales for provider reimbursement in 1992, but Georgia implemented its program too late in the year to markedly affect average fee levels in 1992. We found only a 1.6 percent increase in fees paid for the representative set of procedures from 1989 to 1992 in Georgia.

Zimmerman, 1995). California established toll-free telephone lines to answer providers' questions regarding claims and eligibility status and sent fiscal agents to providers to train their billing personnel. Georgia distributed a recruitment video through the local chapter of the American Academy of Pediatrics (AAP), actively recruited schools as EPSDT providers, provided training to providers in billing, and reduced providers' administrative burden by eliminating referral forms and instituting electronic billing statewide. Michigan implemented a two-tiered EPSDT billing system in 1990 (described in more detail below). Tennessee hired a pediatrician in late 1992 to develop a number of strategies for physician recruitment and retention; these recommendations were not implemented in time to impact provider participation and children's utilization for this study.

Besides these state policies directly affecting providers, other aspects of OBRA-89 indirectly affected provider participation by increasing the demand for their services. For example, the eligibility expansions that dramatically increased enrollment during the study period, the provision requiring States to provide all Medicaid-allowed treatment to correct problems identified during EPSDT screens, the changes in the periodicity schedules, and efforts to increase children's EPSDT participation rates all increased demand and hence potentially increased provider participation as well.

2.3 Informing and Outreach

The 80-percent EPSDT participation target set by the Secretary of DHHS did not carry with it any specific guidance on how States should change the way they administer their EPSDT program. Many States responded by increasing their EPSDT informing and outreach efforts.

EPSDT informing and outreach activities are often limited to new enrollees or targeted to subsets of the enrolled child population. Families with children are initially told about EPSDT during the Medicaid enrollment process. Unfortunately, eligibility interviews can take several hours and often include assessments of eligibility not only for Medicaid. but for AFDC, Food Stamps. and other related programs as well. As a result, EPSDT informing typically receives very little emphasis during the overall eligibility process. In Georgia, Michigan and Tennessee, all eligible children are targeted for additional contact, although resource limitations have required health departments to focus their efforts on infants and young children. In California, additional outreach is limited to families who express an interest in the program during the eligibility interview.

Although variations exist across the study States, outreach strategies typically include sending letters and/or placing phone calls to families to inform them of the importance of EPSDT screening visits and to offer assistance with finding providers and arranging transportation. In only a limited number of sites were resources reported to be sufficient to allow for home visits to be routinely conducted, although public health officials across the study States recognized home visits as the most effective means of engaging families.

In response to the EPSDT participation target, States were rethinking how and by whom outreach services should be delivered. For example, in Michigan, the Medicaid agency began distributing monthly outreach reports to managed care providers under contract with the State, while also diverting a portion of its outreach budget from the local health departments to health maintenance organizations (HMOs) to support HMO-based outreach activities. At the time of the site visits, the Medicaid agencies in both Georgia and Michigan were experimenting with contracting out portions of the EPSDT outreach function to private firms.

2.4 EPSDT Periodicity Schedules

Under the EPSDT program, States are required to develop and disseminate periodicity schedules that outline at what ages specific preventive and screening services are to be delivered to children. However, the Federal regulations do not require that a common national standard be followed. As a result, important differences exist among the State programs.

Screening Visits. A key feature of the EPSDT program is the provision of comprehensive, periodic well-child examinations or screening visits. Screening visits are to be provided at appropriate age-based intervals, according to the State's periodicity schedule. For the study period 1989-1992, the AAP recommended that every child obtain a total of 20 visits from birth to age 21 years. The periodicity schedules in effect in three of the study States in 1989 differed from the schedule recommended by the AAP; only Georgia had adopted the AAP schedule for its EPSDT program (Table 3).

Michigan's schedule recommended many fewer visits for children under seven years of age than the other States or AAP in 1989. The AAP recommended that children have nine well-child visits by their second birthday, an annual visit through age six, and one visit every other year after that through age 20. Michigan recommended only three EPSDT screening visits by the child's second birthday and one visit every other year from age two through 20. On the other hand, California and Tennessee followed the AAP recommendations for younger children but recommended fewer visits for older children. California recommended an EPSDT screening visit only once every four years for children aged nine to 20 years, and Tennessee recommended an EPSDT screening visit only once every third year for children aged 12 to 20 years.

Among the study States, only Michigan changed its periodicity schedule for EPSDT screening visits during the study period. By 1992, Michigan had increased the number of recommended screening visits to comply with the AAP standards.

Immunizations. The States' periodicity schedules for common childhood immunizations followed the AAP guidelines more closely. Nevertheless, there were a few discrepancies in recommendations for the six common immunizations—diphtheria-tetanus-pertussis (DTP), oral polio vaccine (OPV), measles-mumps-rubella (MMR), tetanus-diphtheria (Td), haemophilus influenza type b (Hib), and hepatitis B virus (HBV).

Table 3. Number of Recommended Well-Child Visits According to the AAP Periodicity Schedule and the State EPSDT Screening Schedules

	AAP	California	Georgia	Michigan	Tennessee
1989					
Birth to 12 months	6	6	6	2-3	6
1-2 years	3	3	3	1	3
2-5 years	3	2	3	1	3
6-8 years	2	1	2	1	2
9-20 years	6	3	6	6	4
Total	20 visits	15 visits	20 visits	11-12 visits	18 visits
1992					
Birth to 12 months	6	6	6	6	6
1-2 years	3	3	3	3	3
2-5 years	3	2	3	3	3
6-8 years	2	1	2	2	2
9-20 years	6	3	6	6	4
Total	20 visits	15 visits	20 visits	20 visits	18 visits

In both 1989 and 1992, to capitalize on the opportunity presented by required school physicals, California recommended the second MMR vaccination be administered at school entry rather than at 11 to 12 years of age. By 1992, Georgia was also making this recommendation. Furthermore, in 1992, both California and Georgia followed the Advisory Committee on Immunization Practices of the U.S. Centers for Disease Control (CDC) and Prevention, which recommended the fourth dose of DTP and the third dose of OPV be administered at 15 months of age rather than at 18 months of age.

In 1992, Georgia also recommended the third Hib dose be administered at six months of age rather than at 15 months and the newly added HBV vaccination be administered at two, four, and six months of age rather than the AAP-recommended administration interval of birth, two and 18 months. In addition, Michigan had no specific recommendation for administration of the Hib vaccine in 1989 but was following AAP guidelines for all immunizations by 1992.

Vision, Hearing, and Dental. Vision, hearing and dental services are part of the comprehensive EPSDT screening visit. Because the States had periodicity schedules for comprehensive screening visits in place prior to OBRA-89, officials in Georgia, Michigan, and Tennessee believed that their programs were already in compliance with the OBRA-89 requirement that States have distinct periodicity schedules for these services. California, in response to this provision, developed a distinct periodicity schedule for dental services to complement those already in place for screening, vision, and hearing services.

Lead Screening. The OBRA-89 provision that lead screening be included in EPSDT screening visits for children aged one to five years and others at risk for lead poisoning had little or no effect in the study States, until recently (Hill and Zimmerman, 1995). Although all of the study States covered lead screening prior to OBRA-89, in Georgia, Michigan, and Tennessee protocols were generally not well defined and providers rarely included lead screening as part of the comprehensive screening examination. In contrast, California has reimbursed providers for lead testing when medically indicated since 1983 and, over the years, has publicized the problem of childhood lead poisoning and has encouraged pediatricians to screen children. California also facilitated the development of an extensive network of laboratories proficient in lead testing.

In 1991, CDC issued guidelines that specified the frequency and type of lead testing that should be performed. Through adoption of CDC's recommendations, HCFA and the States have significantly upgraded their lead screening policies. For example, at the time of the site visits, all four study States required that a blood lead test, rather than the less sensitive erythrocyte protoporphyrin test, be performed for the initial lead screening as recommended by CDC (Hill and Zimmerman, 1995).

2.5 Preventive Care Outside of EPSDT

Although the 80-percent EPSDT target emphasized the importance of EPSDT screens, it failed to acknowledge the fact that, in many States, Medicaid children receive preventive care outside of EPSDT, in the so-called "shadow" EPSDT program. Therefore, an EPSDT participation rate computed as the percentage of children for whom EPSDT screens were billed would undercount the number of Medicaid children who actually received well-child examinations by excluding those billed as office visits for preventive care through the regular Medicaid program.

All four study States had shadow EPSDT programs to varying degrees. In 1989, a substantial shadow program existed in Michigan, where EPSDT providers were restricted to public health departments. Children in California and Tennessee also had a considerable number of preventive care visits covered by Medicaid outside of EPSDT. Although both Georgia and Tennessee disallowed payment for well-child visits outside the EPSDT program, only Georgia had edits in its claims processing system that excluded most payments for procedures and diagnoses that we identified as well-child visits in our claims data analysis. Therefore, we were not able to determine the extent of the shadow program in Georgia. Nevertheless, we have been told by providers and Medicaid officials in Georgia that well-child check-ups were provided and either were not billed to the State or were billed as diagnostic or treatment visits for a medical problem found during the screening procedure.

Only Michigan responded to the target EPSDT participation rate by officially recognizing the shadow program. In September 1990, Michigan opened the doors of its EPSDT program to all private physicians by instituting a two-tiered system. Under the new arrangements, screening visits provided by certified EPSDT providers were counted as "comprehensive" EPSDT screening visits whereas well-child examinations provided by other Medicaid participating physicians were classified as "basic" EPSDT screening visits. In addition, to encourage providers to obtain EPSDT certification, the Michigan Medicaid program set higher reimbursement levels for "comprehensive" screening visits than for "basic" screening visits. As a result, the percentage of all preventive care visits received outside of EPSDT was greatly reduced.

2.6 Coverage of Diagnostic and Treatment Services

The EPSDT program has long been criticized for doing a poor job of linking screening examinations with recommended diagnostic and treatment services. To address this concern, OBRA-89 included a provision regarding coverage of diagnostic and treatment services for Medicaid children. Specifically, the law required States to provide any services to these children that are potentially covered under Medicaid and that are necessary to treat conditions identified during EPSDT screens, regardless of whether the services are included in the State plans.

In 1989, Michigan covered nearly every optional service for which Federal matching funds were available, and California covered most optional services. Georgia and Tennessee covered fewer of these services. However, all four States had some coverage limits on the amount, duration, and scope of mandatory and optional services in their Medicaid programs. But for the most part, these limits were minor in California and Michigan.

The site visits revealed little policy impact of the OBRA-89 provision that Medicaid cover any diagnostic or treatment services needed by children for conditions identified during EPSDT screens (Hill and Zimmerman, 1995). In all four of the study States, Medicaid officials indicated that they believed that their programs' coverage of services was very broad and that they did not need to make major changes to the depth or breadth of coverage of children's services. However, in response to the law, all four Medicaid programs have instituted a medical necessity review process to assess, on a case-by-case basis, whether services beyond those covered by the State plan are needed to treat eligible children.

2.7 Managed Care

Although the movement toward managed care in State Medicaid programs has been accelerating in recent years, during the study period, managed care had made only modest inroads. Three types of Medicaid managed care programs existed in the study States: (1) fully capitated plans, (2) primary care case management (PCCM) with capitation for selected services only, and (3) PCCM with fee-for-service (FFS) payment to providers for all services.

Among the four study States, only Georgia had no children in managed care during the study period. Michigan had the highest percentage of children in managed care plans. Sixteen percent of Medicaid children in Michigan in 1989 and 22 percent in 1992 were in fully capitated plans. Another 10 percent of Michigan's Medicaid children in 1989 and 11 percent in 1992 were in PCCM FFS programs. The percentage of Medicaid children in California in fully capitated plans actually declined over the study period, from 12 percent in 1989 to 10 percent in 1992. However, partially capitated PCCM programs in California grew from 2 percent of the Medicaid child population in 1989 to 6 percent in 1992. Tennessee had the smallest percentage of children in capitated plans at 5 percent and 6 percent in 1989 and 1992, respectively, and in PCCM FFS programs at 1 percent in 1989 declining to less than one percent in 1992.[5]

Because of incomplete data for children in capitated plans. these children are excluded from the analyses described below. Also excluded were children with both Medicaid and Medicare coverage and children residing in long-term care and other medical institutions for all or part of the year.

3 Child Health Providers

3.1 Physicians[6]

3.1.1 Physician Participation

As stated above, one of the goals of OBRA-89 was to increase participation in both Medicaid and EPSDT among office-based physicians providing health care services to children. The number of physicians serving Medicaid children grew significantly from 1989 to 1992 in all four study States. The percentage growth in the number of physicians serving Medicaid children was 43 percent in Georgia, 20 percent in Tennessee, and 17 percent in both California and Michigan (Adams et al., 1996a). However, the growth in the number of participating physicians serving children did not keep pace with the growth in the Medicaid child population in any of the study States, except Michigan (Table 4). Based on county-level estimates, the number of child enrollees per participating physician serving children rose from 1989 to 1992 by 21 percent in California, 20 percent in Georgia, and an even higher 61 percent in Tennessee, but fell 19 percent in Michigan.

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[5] Tennessee did not institute the statewide TennCare program that requires all Medicaid beneficiaries be enrolled in managed care plans until 1994.

[6] Physicians in section 3.1 include those in solo and group practices who had ever billed under their own identity. Physicians who are not individually identifiable because their billing agent is always a free-standing clinic, hospital outpatient department, or other institution are included under institutional providers discussed in section 3.2.

Not all participating physicians serving Medicaid children provide EPSDT or preventive care services; many provide only diagnostic and treatment services. The percentage of physicians serving children who provided any preventive care to children in 1989 and 1992 ranged from a low of 9 percent in Georgia[7] to a high of 30 percent in Michigan. In both California and Tennessee, a little over 20 percent of physicians serving children provided preventive care (Adams et al., 1996a). Smaller percentages of physicians serving children provided EPSDT services in the four study States: 7 percent in California, 3 percent in Tennessee, 2 percent in Georgia, and less than 1 percent in Michigan. The relative proportions of physicians involved in either preventive or EPSDT care changed little from 1989 to 1992 in the study States, with the exception of Michigan. In Michigan, 20 percent of physicians serving children provided EPSDT screening visits to Medicaid children in 1992, up from less than 1 percent in 1989.

Table 4. Average County-Level Ratios of the Number of Child Medicaid Enrollees to the Number of Participating Physicians Among Counties with at Least One Participating Physician by Type of Service

	Physicians Serving Children		**Preventive Care Physicians[1]**		**EPSDT Physicians**	
	1989	**1992**	**1989**	**1992**	**1989**	**1992**
California	424	513	382	373	1,015	1,441
Georgia	830	994	839	976	2,665	2,123
Michigan	678	569	237	233	11,518	377
Tennessee	645	954	325	455	1,386	2,101

[1] Counties with no preventive care physicians were left out of these calculations, making it appear that more physicians provided preventive care than any care at all.

Although the relative proportions of physicians providing EPSDT and other preventive care changed little in three of the study States, the number of physicians providing EPSDT and other preventive care services increased significantly in all four study States (Adams et al., 1996a). For the most part, Georgia and Michigan restricted EPSDT providers to public health departments in 1989 and, consequently, had very low numbers of EPSDT participating providers. The changes in State policies resulting from OBRA-89 led to significant increases in the number of participating EPSDT providers in Georgia (171 percent) and in Michigan (566 percent) and lower ratios of child enrollees per participating EPSDT physician (Table 4). Increases in the number of EPSDT providers were lower in California and Tennessee at 11 percent and 29 percent, respectively. As a result, the ratios of child enrollees to participating EPSDT providers increased in those States.

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[7] Recall that Georgia does not allow physicians to bill for preventive care visits outside of EPSDT. Therefore, the percentage of physicians serving children who provided any preventive care to children calculated from Georgia claims data represents the percentage who were paid for these services and not necessarily the total percentage who provided these services.

Similarly, the numbers of physicians providing any preventive care services (within and outside EPSDT) to children increased significantly: 40 percent in Georgia, 28 percent in Tennessee, and 13 percent in both California and Michigan (Adams et al., 1996a). Furthermore, in California and Michigan, the increases in physicians providing preventive care through Medicaid kept pace with the increases in the number of Medicaid children—the average county-level ratio of child enrollees to physicians providing preventive care declined 2 percent in each of these States from 1989 to 1992 (Table 4). However, in Georgia and Tennessee, where large increases in enrollment occurred during this time, the average county-level ratio of child enrollees to preventive care physicians rose 16 percent and 40 percent, respectively.

3.1.2 Shortage Areas

If we use the AAP cut-off of 2,500 children to one child health provider to define physician shortage areas, the figures in Table 4 suggest that, in the four study States, Medicaid children are on average adequately served by physicians. This holds true even if we use a more conservative cut-off of 1,500 children to one child health provider to account for the greater number of visits to physicians among the Medicaid population. However, shortages of child health physicians did exist in several counties in two of the study States in 1989 and in all of the study States in 1992, with the percentage of counties with shortages increasing over time in all four States (Adams et al., 1996a). In California and Michigan in 1989, no counties had more than 2,500 Medicaid children per participating physician serving children. However by 1992, 6 to 7 percent of the counties in these States were shortage areas. In Georgia, the percentage of counties classified under this cut-off as Medicaid child physician shortage areas increased from 14 percent in 1989 to 19 percent in 1992. In Tennessee, the increase was even greater, rising from 6 percent in 1989 to 17 percent in 1992.

Nevertheless, these measures show some improvement in the availability of participating pediatricians and providers of preventive care in the study States from 1989 to 1992. The percentage of counties without a participating pediatrician declined over the study period in Georgia and Michigan, and the percentage of counties without preventive care physicians serving children declined in California, Michigan, and Tennessee.

3.1.3 Practice Volume and Service Concentration

The average Medicaid child caseload and the mean amount paid per physician by Medicaid for children's health care services also increased in all four States and for all specialties from 1989 to 1992 (Adams et al., 1996a). The largest increases in pediatricians' Medicaid practice volume occurred in Georgia—the average caseload increased 87 percent and the average amount paid per physician doubled (Table 5). Tennessee had the next highest increase in pediatricians' Medicaid practices, with a 51 percent increase in the average caseload and a 74 percent increase in average total payments. Pediatricians in California saw an 18 percent increase in their caseload and a 25 percent increase in total payments on average, and in Michigan, pediatricians' caseloads increased only 6 percent on average but their average total payments increased by 42 percent.

Table 5. Average Medicaid Child Caseloads and Average Total Medicaid Payments for Children Among Participating Pediatricians

	Average Caseload		Average Total Payments	
	1989	1992	1989	1992
California	202	239	$23,076	$28,922
Georgia	276	515	$33,225	$67,207
Michigan	329	350	$20,705	$29,418
Tennessee	279	422	$28,325	$49,256

To determine whether children's health care services are concentrated among a few high volume practices, we computed Herfindahl Indexes (HI) for office-based physicians serving children (Adams et al., 1996a). The index ranges from 0.01 (widely distributed) to 1.00 (totally concentrated in a single practice). We found no evidence of marked concentration in the HI index computed for all children's services (Table 6). In 1989, the HI for all children's services ranged from a low of 0.13 in California and Michigan to 0.34 in Georgia. In 1992, the HI for all children's services actually dropped in all States, except Tennessee, and ranged from a low of 0.11 in California to a high of 0.29 in Georgia and Tennessee. The lower HI values for California and Michigan is related to the greater supply of physicians in these States that allowed Medicaid enrollees to be spread across a larger number of providers.

In all study States, service provision became more concentrated with the more narrowly defined services. This was most pronounced in Georgia and Tennessee (Table 6). The concentration of these services was either stable or declined somewhat from 1989 to 1992. The most marked change was in Michigan where the HI for EPSDT services declined from 0.78 to 0.45.

Table 6. Herfindahl Indexes for Office-Based Physicians Serving Medicaid Children by Type of Service

	All Services		Preventive Care		EPSDT Services	
	1989	1992	1989	1992	1989	1992
California	0.13	0.11	0.24	0.25	0.27	0.27
Georgia	0.34	0.29	0.70	0.66	0.79	0.76
Michigan	0.13	0.12	0.27	0.27	0.78	0.45
Tennessee	0.28	0.29	0.57	0.53	0.72	0.66

3.1.4 Effects of Medicaid Fees and Other Incentives

As mentioned above, in response to OBRA-89, the States undertook a variety of activities aimed at increasing the number of physicians providing services to Medicaid children. Unfortunately, we did not have individual-level information on non-participating physicians and, therefore, could not perform an analysis of whether the States' efforts had a significant effect on physician participation.[8] However, we were able to determine whether participating physicians were more likely to provide preventive care services in general and EPSDT services in particular and whether participating physicians serving children increased their Medicaid child caseloads in response to these activities.

We ran logistic regression equations on the decisions to provide preventive care and EPSDT services among participating physicians serving children and a log-linear ordinary least squares (OLS) regression on the size of participating physicians' Medicaid child caseloads (Adams et al., 1996b). For all three regressions, we pooled data across the four study States and two analysis years, and we entered a variety of variables to control for changes in demand and supply for physicians' services and in the cost of physicians' practices. In addition, to estimate the impact of the State's efforts to increase physicians' caseloads and their provision of EPSDT and other preventive services, we entered the index of Medicaid-to-private fees and a dichotomous variable for 1992, plus interaction terms for the 1992 variable and indicators for three of the States, using Tennessee as the reference State. We found significant, positive effects of Medicaid fees on all three dependent variables and of other State activities between 1989 and 1992 on all three dependent variables in all States, except on the probability of providing EPSDT screening services in Tennessee.

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[8] We attempted to estimate county-level equations, but these proved unsatisfactory.

The estimated effects of the relative fee changes and other State activities are shown in Table 7. Recall that the Medicaid-to-private fee index for preventive services, used in the first two equations, fell in all States, except Michigan from 1989 to 1992, and the Medicaid-to-private fee index for the representative set of services, used in the third equation, fell in Georgia from 1989 to 1992 and rose only in California and Tennessee. Holding constant various demand and supply factors, the net effect of program changes from 1989 to 1992 on the probability of participating physicians providing preventive care was positive in all States, except Georgia. In Georgia, the effect of the fall in relative prices was exactly offset by the positive effect of other program changes. The net impact of relative fee and other program changes from 1989 to 1992 on the probability of participating physicians providing EPSDT screens was large and positive in Michigan, small and positive in Georgia, and negative in the other two States. Finally, relative fee and other program changes resulted in significant, positive net effects on participating physicians' Medicaid child caseloads in all study States, ranging from a 14.5 percent increase in Michigan to a 52.3 percent increase in Georgia.

Table 7. Impact of Medicaid Fees and Other Program Changes on the Probability of Physicians Providing Preventive Care and EPSDT Screens and on the Number of Children Served by Physicians

	Probability of Providing Preventive Care (Log-Odds Ratio)			**Probability of Providing EPSDT Screens** (Log-Odds Ratio)			**Number of Medicaid Children Served** (Percentage Change)		
	Fee[1]	**Other**	**Net**	**Fee[1]**	**Other**	**Net**	**Fee[2]**	**Other**	**Net**
California	0.92	1.16	1.07	0.76	0.72	0.55	4.0	14.5	18.5
Georgia	0.81	1.42	1.00	0.49	2.51	1.23	-5.6	57.9	52.3
Michigan	1.37	0.89	1.22	2.92	13.62	39.77	—	14.5	14.5
Tennessee	0.90	1.42	1.28	0.68	—	0.68	3.9	14.5	18.4

NOTE: For the impact of the fee changes, the log-odds ratio was computed by taking the exponent of the product of the percentage change in the respective Medicaid-to-private fee index and the coefficient of the fee variable. For the impact of other program changes, the log-odds ratio was computed by taking the exponent of the sum of the coefficients for the year variable and the interaction term for the year and state. Where the coefficients were not significant, they were set to zero. The net impacts of state activities were computed by multiplying the log-odds of the fee and other program changes in the first two (logit) equations and summing the percentage changes in the third (OLS) equation.

[1] Based on the percentage changes in the Medicaid-to-private fee index for a subset of preventive care services.

[2] Based on the percentage changes in the Medicaid-to-private fee index for a set of representative services.

3.2 Institutional providers

Included in the physician counts discussed above are physicians who bill under their own identity. Many other physicians bill under an institutional entity, such as a free-standing clinic or hospital outpatient department. In addition, other providers such as medical laboratories and home health agencies also provide services to Medicaid children. The numbers of free-standing clinics, hospital outpatient departments, and other providers serving children increased in all four study States from 1989 to 1992 (Table 8).

Table 8. Number of Institutional Providers Serving Children by Type of Institution

	Free-Standing Clinic		Hospital Outpatient Department		Other Providers	
	1989	1992	1989	1992	1989	1992
California	1,445	2,612	2,547	3,614	5,003	6,465
Georgia	261	458	161	164	952	1,130
Michigan	705	1,060	181	192	968	1,210
Tennessee	754	925	138	148	584	756

Free-standing clinics were the other major provider of ambulatory visits to Medicaid children in all study States and were the dominant provider of preventive care visits to Medicaid children in Georgia and Michigan in both 1989 and 1992. These clinics include public health departments, rural and community health centers, other federally qualified health centers (FQHCs), and school-based clinics. The average Medicaid child caseload and total Medicaid payments for children among participating clinics in 1989 and 1992 are shown in Table 9.

Table 9. Average Medicaid Child Caseloads and Average Total Medicaid Payments for Children Among Participating Clinics

	Average Caseload		Average Total Payments	
	1989	1992	1989	1992
California	154	233	$28,753	$43,982
Georgia	480	598	$35,218	$55,479
Michigan	295	239	$23,654	$43,855
Tennessee	200	296	$24,982	$40,482

Only in Georgia did clinics have higher average Medicaid child caseloads compared to office-based pediatricians. However, Medicaid child caseloads among participating clinics increased significantly from 1989 to 1992 in all study Sates, except Michigan. Despite the decline in the average Medicaid child caseload, average Medicaid payments for children to clinics rose 85 percent from 1989 to 1992 in Michigan, substantially more than the increase in the average payment to pediatricians in Michigan (42 percent) and the increases in the average payment to clinics in the other three study States—53 percent in California, 58 percent in Georgia, and 62 percent in Tennessee.

3.3 Place of Service

Although the States were successful in increasing participation in Medicaid among office-based physicians serving children, they were not consistently successful in shifting greater percentages of Medicaid expenditures from institutional providers to office-based providers. As shown in Table 10, the percentage of Medicaid payments for ambulatory visits that went to office-based physicians declined in all four study States (Adams et al., 1996a). However, the percentage of Medicaid payments for preventive care visits that went to office-based physicians increased in three States—all except Michigan—and the percentage of payments made for EPSDT visits that went to office-based physicians increased in Georgia and Tennessee. In Michigan, increases in office-based EPSDT visits were more than matched by increases in EPSDT visits at school-based clinics.

Table 10. Percentage of Medicaid Payments for Ambulatory Visits Paid to Office-Based Physicians by Type of Visit

	All Ambulatory Visits		Preventive Care Visits		EPSDT Screening Visits	
	1989	1992	1989	1992	1989	1992
California	59	53	74	85	85	80
Georgia	59	56	16	31	14	29
Michigan	51	44	76	64	26	20
Tennessee	52	49	45	59	45	54

3.4 Dentists

In contrast to the significantly higher numbers of medical providers serving Medicaid children in 1992 compared to 1989, the number of dental providers serving Medicaid children increased only modestly in three of the study States and significantly declined in the fourth. The number of dentists serving Medicaid children increased 2 to 3 percent in Georgia and Tennessee and a larger 9 percent in California, but declined 10 percent in Michigan.

The modest growth in the numbers of dental providers serving Medicaid children combined with the large increases in the number of Medicaid child enrollees from 1989 to 1992 led to substantial increases in the ratios of child enrollees to participating dental providers, the average Medicaid child caseloads per participating dental provider, and the average total Medicaid payments for children per participating dental provider (Table 11). Despite the decline in the number of dental providers serving Medicaid children, the smallest increases in these figures occurred in Michigan, which also had the smallest increase in children covered by Medicaid from 1989 to 1992.

Table 11. Average County-Level Ratios of the Number of Child Medicaid Enrollees to the Number of Participating Dentists, Average Medicaid Child Caseloads and Average Total Medicaid Payments for Children Among Participating Dentists

	Child Enrollees Per Dental Provider		Average Caseload[1]		Average Total Payments[1]	
	1989	1992	1989	1992	1989	1992
California	487	837	77	109	$6,636	$17,006
Georgia	481	793	117	189	$13,482	$23,467
Michigan	409	468	86	101	$5,989	$7,707
Tennessee	427	640	79	129	$9887	$15,994

[1] Average caseloads and total payments are for dentists billing individually. Data on dental clinics are not included in these figures but are shown in Adams et al., 1996a.

4 Children's Health Care Use and Expenditures

4.1 Medicaid Experience

4.1.1 EPSDT Participation and Overall Preventive Care Visit Rates

We found that, through the EPSDT program in 1989, the four study States were reaching about 40 percent of Medicaid children expected to have well-child visits—half the 1995 target rate (Herz et al., 1995). The results improved somewhat when we considered both EPSDT screening visits and other well-child visits paid through the Medicaid program; half or fewer Medicaid children expected to have visits had received well-child care through Medicaid, but only 30 to 46 percent of all recommended visits were made (Table 12).[9] In addition, despite the legislated service enhancements and focus on screening visits, these percentages improved only slightly from 1989 to 1992 (Herz et al., 1996b). We found no improvement in the preventive care rates in California during this time,[10] and in the other three States, the percentage of children with any preventive care visits increased a modest two to four percentage points and the percentage of recommended well-child visits that were made increased only six to 13 percentage points.

Table 12. Preventive Care Participation and Visit Rates Based on All Medicaid-Paid Well-Child Visits and the AAP Periodicity Schedule

	Participation Rates[1,3]		Visit Rates[2,3]	
	1989	1992	1989	1992
California	47	46	44	44
Georgia	41	43	30	36
Michigan	51	54	46	59
Tennessee	41	45	38	45

[1] Participation rates are the percentages of children expected to have well-child visits who actually had visits.
[2] Visit rates are the percentages of visits recommended for the child population that were actually made.
[3] These rates have been adjusted for age and duration of Medicaid coverage.

This period saw a large increase in the number of children enrolled in Medicaid. Thus, the lack of substantial gains in the preventive care participation and visit rates may arise from the inability of the health care system to absorb the increase in demand. To test this theory, we ran multivariate regression analyses in which we separately entered a county-level ratio of the number of participating primary care providers serving children to the number of child enrollees, a 1992 indicator variable, and a variable for the interaction between these two variables. We also controlled for the child's demographic characteristics; the child's Medicaid enrollment category and duration; whether the child lived in an urban, suburban or rural county; and other county-level provider supply variables (e.g., the number of participating clinics per 1,000 population and whether the county is identified as a physician shortage area). We ran logistic regressions to estimate the probability that children received any well-child visits and ordinary least squares regressions on the number of visits made among children with visits. These analyses were restricted to children under three years of age, who were expected to have at least one visit during the analysis year.

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[9] We found that the participation and visit rates computed with Medicaid-covered preventive care visits from the 1987 National Medical Expenditure Survey data fell within the range of rates computed with the 1989 claims data for the four study States. In addition, we found that although the majority of preventive care visits among children enrolled in Medicaid in 1987 were covered by Medicaid, slightly more than 10 percent were covered by other sources. These findings suggest that the results from the claims analyses can be considered representative of children's Medicaid experience in most States and that estimates from these data encompass the majority of these children's preventive care use. However, researchers and policy makers should be aware that measures of annual preventive care use among Medicaid children computed from claims data underestimate these children's total use by a small but not insignificant amount.

[10] The lack of improvements in preventive care use among Medicaid children in California may be at least in part a result of the large increase in Medi-Cal coverage of children of undocumented aliens who were eligible for only a limited set of services.

The estimated impact of the OBRA-89 provisions on the probability of any well-child visits and the number of visits obtained are presented in Table 13. The estimated impact is broken out by changes in the provider/child ratio and other program changes.

Table 13. Estimated Impact of OBRA-89 Provisions on the Probability of Any Well-Child Visits and the Number of Visits Among Children with Visits for Children under Three Years of Age

	Log-Odds Ratio[1]: Probability of Any Visits 1992 to 1989			Change in the Number of Visits[2] Among Children With Visits		
	Provider/ Child Ratio	Other Program Changes	Combined Effect	Provider/ Child Ratio	Other Program Changes	Combined Effect
California	0.92	—	0.92	-0.03	0.07	0.04
Georgia	1.02	1.64	1.66	—	0.15	0.15
Michigan	—	1.52	1.52	0.01	0.24	0.25
Tennessee	1.03	—	1.03	-0.05	—	-0.05

[1] For the impact of the change in the provider/child ratio, the log-odds ratio was computed by taking the exponent of the product of the change in the respective provider/child ratio from 1989 to 1992 and the sum of the estimated coefficients for the provider/child ratio and the interaction term between the provider/child ratio and the 1992 indicator variable. For the impact of other program changes, the log-odds ratio was computed by taking the exponent of the 1992 indicator variable.

[2] For the impact of the change in the provider/child ratio, the change in the number of visits was computed by taking the product of the change in the respective provider/child ratio from 1989 to 1992 and the sum of the estimated coefficients for the provider/child ratio and the interaction term between the provider/child ratio and the 1992 indicator variable. The estimated coefficient for the 1992 indicator variable was used as the estimate of other program changes.

The ratio of participating primary care providers serving children declined in three of the study states from 1989 to 1992; it fell by 25 percent in California, 23 percent in Tennessee, and 9 percent in Georgia, but grew 7 percent in Michigan. However, we found that the deterioration in the ratio of participating primary care physicians to Medicaid child enrollees had a significant, negative impact on the probability of any well-child visits among Medicaid children under three only in California and a significant, but small, negative effect on the number of visits made by Medicaid children under three only in California and Tennessee (Herz et al., 1996a). Furthermore, in Georgia and Michigan, responses to the OBRA-89 provisions affecting factors other than the number of providers or the number of enrollees had independent, positive effects on the probability that children had well-child visits and the number of well-child visits among children with visits. These efforts include outreach and parent education programs aimed at getting parents to bring their children in for well-child visits and incentives to physicians to increase their Medicaid caseloads.

4.1.2 Immunizations

Among the most important components of EPSDT and other well-child visits are immunizations for childhood diseases. Failure to achieve adequate and timely rates of immunizations among young children risks outbreaks of serious diseases with resulting increases in death and disability. Unfortunately, the low rates of preventive care use that we found among Medicaid children in the four study States translates to equally low immunization rates.

We computed completion rates for basic childhood immunizations that the children should have had during their Medicaid enrollment period.[11] In 1989, less than half of these children received the recommended immunizations for their age group (Table 14). Significant but modest improvements were noted over the study period, with the largest increases seen in Georgia (15 percentage points), Tennessee (11 percentage points), and Michigan (9 percentage points). California had a small two-percentage-point increase.

Although the Medicaid programs in our study States were not successful in getting the targeted percentage of children in for preventive care and immunizations, they were successful in at least making up for some of the backlog of missed immunizations among the children who did seek care. If we include all childhood immunizations children had in the numerator instead of only those that children of their age were recommended to have by the AAP, the rates increase substantially (Table 14).

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[11] As stated above, these include diphtheria-tetanus-pertussis (DTP), oral polio vaccine (OPV), measles-mumps-rubella (MMR), tetanus-diphtheria (Td), haemophilus influenza type b (Hib), and hepatitis B virus (HBV).

Table 14. Immunization Completion Rates Based on All Medicaid-Paid Immunizations and the AAP Periodicity Schedule

	Age-Appropriate Immunizations		All Immunizations	
	1989	1992	1989	1992
California	48	50	66	68
Georgia	46	61	63	80
Michigan	39	48	54	69
Tennessee	47	58	61	79

Nevertheless, a considerable number of children with EPSDT visits remained less than fully immunized at the end of their visits.[12] Data on whether the child was up-to-date in his/her immunizations were collected in the screening forms providers fill out during EPSDT visits in three of the study States. In tabulations of these data, we found that, at the time of their last EPSDT visit in 1989, 83 percent of EPSDT-screened children in Michigan, 81 percent of these children in Tennessee, and 70 percent in California were up-to-date in their immunizations (Gavin et al., 1996). In 1992, the percentage of EPSDT-screened children up-to-date in their immunizations rose slightly to 73 percent in California (the only State for which we had 1992 data.)

The modest impact of OBRA-89 on improving immunization completion rates from 1989 to 1992 was confirmed in multivariate analyses (Herz et al., 1996a). The decrease in the provider/child ratio had a sizable effect only in California whereas other changes resulting from OBRA-89 had relatively small effects on the probability of any immunizations (Table 15). The number of immunizations increased by more than one vaccination per child on average. However, this increase is largely a result of the addition of hepatitis B virus (HBV) vaccination to the list of recommended childhood immunizations in 1992.

4.1.3 Problem Identification, Treatment, and Referral

During our site visits, providers reported that, on average, 50 percent of children screened had a health problem needing attention (Hill and Zimmerman, 1995). According to the providers, the ailments most frequently detected were common childhood problems, such as otitis media, skin rashes, and respiratory infections. Dental problems among children were also widespread in the four study States, and developmental, behavioral, and nutritional problems were noted in several States as being commonly found among Medicaid children. We also found that, depending on the training and capacity of the provider, many of these health problems were immediately treated by the screening provider. For more complicated cases, referrals were made to outside providers.

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[12] Most of these immunizations require multiple administrations. Although an accelerated schedule for children who are behind exists, it nevertheless requires multiple visits.

Table 15. Estimated Impact of OBRA-89 Provisions on the Probability of Any Childhood Immunizations and the Number of Immunizations Among Children with Immunizations for Children under Three Years of Age

	Log-Odds Ratio[1]: Probability of Any Visits 1992 to 1989			Change in the Number of Immunizations[2] Among Children With Immunizations		
	Provider/ Child Ratio	**Other Program Changes**	**Combined Effect**	**Provider/ Child Ratio**	**Other Program Changes**	**Combined Effect**
California	0.96	1.19	1.14	-0.03	1.10	1.07
Georgia	0.99	1.21	1.21	—	1.36	1.36
Michigan	—	1.43	1.43	—	1.01	1.01
Tennessee	—	1.10	1.10	—	1.23	1.23

[1,2] See footnotes 1 and 2 of Table 13.

To verify these findings, we analyzed data from administrative forms on which providers recorded information on the health status of children during the EPSDT screening visits (Gavin et al., 1996). Because the data collected differed among the four States, an overall comparison of findings was not feasible. However, an in-depth cross-state comparison of problem identification, treatment, and referral rates was made for Georgia and Michigan in 1989, as was an analysis of changes in these measures from 1989 to 1992 for Georgia.

As shown in Table 16, the analysis confirmed findings from the case studies. EPSDT providers identified physical/mental health care needs for more than half of the children screened in 1989—54 percent in Georgia and 60 percent in Michigan (Gavin et al., 1996). As found in the case studies, ear, skin and chest/lung problems were among the most frequently identified health care needs for treatment and/or referral. Other frequently found problems related to nutrition, eyes, blood, and the musculoskeletal system. In both States, nearly all children aged three years and older who had an EPSDT screening visit were either treated or referred for dental care.

The prevalence and types of heath care needs among children with visits remained fairly constant from 1989 to 1992. The prevalence of chest/lung problems increased slightly, especially among toddlers (1-2 year-olds), and the prevalence of skin/subcutaneous problems increased slightly among infants. At the same time, the percentage of children receiving nutrition counseling declined in all age groups except infants.

In general, the problems identified through EPSDT screens were more likely to be treated by the EPSDT provider than referred to another provider (Table 16). Although EPSDT providers treated children for physical/mental health problems at similar rates in Georgia and Michigan (43 percent v. 37 percent), referral rates differed substantially across the two States; providers in Georgia made referrals for physical/mental health care about half as often as providers in Michigan during 1989—17 percent v. 35 percent. In contrast, children in Georgia were twice as likely to be referred for dental care than were children in Michigan in 1989—33 percent v. 15 percent. These differences are, at least in part, a result of differing resources available among EPSDT and other community providers in the two States, as well as to State-specific Medicaid program characteristics.

Table 16. Percentage of Children with Health Care Needs Identified During EPSDT Screening Visits and the Percentage of EPSDT Screening Visits with Health Care Needs That Were Treated and/or Referred

	Michigan 1989		Georgia 1989		Georgia 1992	
	Physical Health	Oral Health	Physical Health	Oral Health	Physical Health	Oral Health
Percentage of children with needs	60	64	54	60	54	50
Percentage of visits in which children were:						
Treated only	25	48	36	18	37	16
Referred only	23	15	10	33	7	20
Treated & referred	12	<1	7	<1	4	<1

A slightly lower percentage of problems was treated during EPSDT screening visits in Georgia in 1992 compared to 1989; the largest decreases were found for eye problems, nutrition counseling, and oral (dental) health. These decreases were partially offset by increases in the incidence of treatment for skin/subcutaneous, chest/lung, and ear problems. A somewhat larger decrease in the percentage of visits with referrals is evident from 1989 to 1992. Referrals were made for physical/mental problems during 17 percent of the visits in

1989 and 11 percent of the visits in 1992. Similarly, referrals were made for oral health care during 33 percent of the visits in 1989 and 20 percent of the visits in 1992. These trends are consistent with more frequent visits per child—i.e., after an initial referral for a particular problem, the child may have been treated or under care during subsequent visits and therefore would not need another referral. The number of visits per child rose 20 percent in Georgia from 1989 to 1992. The differences may also be explained by less severe problems found among the newly eligible expansion children.

4.1.4 Diagnostic and Treatment Services

To determine whether the increased preventive care visits and the OBRA-89 provision that States cover all medically necessary services eligible for Federal financial assistance changed utilization of diagnostic and treatment services, we investigated children's use of diagnostic and treatment visits, prescription drugs, hospitalizations, and other health care services. The percentage of children who utilized each of these service types and the number of these services utilized on average by children with these services in 1989 and 1992 are shown in Tables 17 and 18.

Table 17. Percentage of Medicaid Children with Any Diagnostic and Treatment (D&T) Visits and Any Prescription Drugs and the Number of D&T Visits and Prescriptions Among Users of These Services

	Percentage of Children with Any D&T Visits		**D&T Visits Per Child with Visits**		**Percentage of Children with Prescriptions**		**Prescriptions Per Child with Prescriptions**	
	1989	**1992**	**1989**	**1992**	**1989**	**1992**	**1989**	**1992**
California	64	62	5.2	5.2	55	54	6.0	6.7
Georgia	65	70	4.4	5.8	59	64	5.8	6.6
Michigan	69	71	5.1	5.7	60	63	5.5	6.0
Tennessee	67	71	5.4	6.6	57	64	5.4	6.7

Except for hospital services, the percentage of children with diagnostic and treatment services and the number of services among children with each service type increased from 1989 to 1992 in Georgia, Michigan, and Tennessee (Herz et al., 1996b). California was the only State with a different trend in outpatient service use over the study period.[13] For hospital services, the percentage of children with stays, the number of hospitalizations, and the total number of hospital days among children with at least one stay decreased slightly from 1989 to 1992 in all States, with only a few exceptions. In particular, in Michigan, the percentage of children with stays and the number of hospitalizations among children with at least one stay was unchanged over the study period and, in Tennessee, the number of hospital days among children with stays increased.

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[13] This divergence may be also be caused by the large increase in undocumented aliens who were in the State's Medicaid program but were not eligible for the full set of Medicaid-covered services.

Table 18. Percentage of Children with Any Hospital Stays and Other Health Services and the Number of Hospital Stays and Days Among Children with Hospital Stays

	Percentage of Children with Hospital Stays		Hospital Stays Per Child with Stays		Hospital Days Per Child with Stays		Percentage of Children with Other Care	
	1989	**1992**	**1989**	**1992**	**1989**	**1992**	**1989**	**1992**
California	6	5	1.2	1.3	6.2	5.8	51	49
Georgia	11	10	1.3	1.2	6.9	6.5	54	56
Michigan	13	13	1.2	1.2	4.5	4.2	60	61
Tennessee	11	9	1.3	1.2	6.2	6.5	61	65

Multivariate regression analyses similar to those described above for preventive care visits suggest that changes from 1989 to 1992 including the OBRA-89 provisions had less of an impact on illness- and disability-related care than on preventive care in Georgia and Michigan but greater impacts in California and Tennessee (Tables 19 and 20) (Herz et al., 1996a). However, the net impact on the probability of any diagnostic and treatment visits was negative in California whereas it was positive in Tennessee. The ratio of primary care physicians serving children to child enrollees had little impact on any of these measures, except in Tennessee where the decrease in this ratio led to a decrease in the average number of diagnostic and treatment visits.

The direct effect of program changes on the number and types of services utilized is difficult to disentangle from other concurrent changes in the States and in the medical, social, and economic environment in which the Medicaid programs of the four States operate. The use of a pre/post dummy variable to represent program changes without a control population runs the risk of attributing other changes occurring over time to the program changes. In particular, our results for hospitalizations must be interpreted with care. The change in the probability of hospitalizations among Medicaid children in the four study States over the study period followed the declining national trend. However, although nationally the average length of hospital stays also declined, only in Georgia was the decline in the probability of hospitalization among Medicaid children accompanied by a significant decrease in the number of hospital days among children with hospitalizations (Table 20).

Table 19. Estimated Impact of OBRA-89 Provisions on the Probability of Any Diagnostic and Treatment (D&T) Visits and the Number of D&T Visits Among Children with Visits

	Log-Odds Ratio[1]: Probability of Any D&T Visits 1992 to 1989			Change in the Number of D&T Visits[2] Among Children With Visits		
	Provider/ Child Ratio	Other Program Changes	Combined Effect	Provider/ Child Ratio	Other Program Changes	Combined Effect
California	0.98	0.82	0.80	-0.10	—	-0.10
Georgia	1.01	—	1.01	-0.01	0.60	0.59
Michigan	—	—	—	0.01	0.18	0.18
Tennessee	0.98	1.18	1.15	-0.29	—	-0.29

[1,2] See footnotes 1 and 2 of Table 13.

Table 20. Combined Estimated Impact of OBRA-89 Provisions on the Probability of Any Prescription Drugs and Hospital Stays and the Number of Prescriptions and Hospital Days Among Children with Any Use of These Services

	Prescription Drugs		Hospital Stays[1]	
	Log-Odds Ratio[2]: 1992 to 1989	Change in the Number of Prescriptions[3]	Log-Odds Ratio[2]: 1992 to 1989	Change in the Number of Hospital Days[3]
California	0.91	1.63	0.83	—
Georgia	1.02	0.05	0.75	-0.15
Michigan	1.07	0.47	0.83	—
Tennessee	1.12	0.95	0.75	—

[1] These regressions were restricted to children aged one to 12 years.
[2,3] See footnotes 1 and 2 of Table 13.

We also entered a variable for whether the child had any preventive care use during the year in each of the regression equations. This variable had a consistent, significant, positive effect on all of the utilization measures we investigated, except for the number of hospital days among children aged one to 12 years with hospitalizations (Herz et al., 1996a). For the number of hospital days, we found a significant negative effect in California and no significant effect in the other three study States. Thus, for Medicaid children in 1989 and 1992, preventive care was complementary to other health care services. Whether this complementarity stemmed from treatable problems discovered in preventive care visits for which the preventive care providers facilitated treatment or the promotion and facilitation of preventive care by providers treating illnesses and disabilities or both cannot be determined in this analysis.

4.1.5 Dental Services

States are mandated to provide a broad range of dental services to Medicaid eligible children to comply with EPSDT requirements. Basically, starting at three years of age (or earlier if medically necessary), children are expected to have a routine oral examination performed by a dentist at least annually. Furthermore, OBRA-89 specified that dental services must include those for the relief of pain, infections, restoration of teeth, and maintenance of dental health.

We found that fewer than 30 percent of Medicaid children received any dental care in the four study States during both study years (Herz et al., 1996b). In California, only 20 percent of children enrolled in the Medicaid program received any dental care in 1989. This percentage changed little from 1989 to 1992 (Table 21). The situation was not much better in the other three States, with the percentage of children with any dental care declining from 28 percent to 27 percent in Georgia, remaining constant at 26 percent in Michigan, and increasing only two percentage points from 27 percent to 29 percent in Tennessee.

The majority of children with dental care were school-aged; 60 to 70 percent of children who received dental care through the Medicaid program in the four study States were at least seven years old (Herz et al., 1996b). Less than 5 percent of the dental care recipients were under three years of age, which is not surprising given that, as shown above, dental treatment and/or referrals were not generally provided under EPSDT to these younger children (Gavin et al., 1996). Children aged seven to 12 years of age had the highest utilization rates. In 1992, the percentage of children aged seven to 12 years who had received any dental care ranged from 32 percent in California to 44 percent in Tennessee (Herz et al., 1996b).

Children who had some preventive care were much more likely to have also had some dental care. Recall that we found that virtually all children aged three years and over in Georgia who had EPSDT visits were treated or referred for dental care (Gavin et al., 1996). However, among children aged seven to 12 years in Georgia who had EPSDT visits in

1992, only 65 percent had any Medicaid-covered dental care that year. This compares to 37 percent of seven-to-12-year olds who had no EPSDT visits in 1992 (Herz et al., 1996b).

Table 21. Percentage of Children with Any Dental Care and Number of Dental Claims Per Person-Year Enrolled Among Children with Any Dental Care

	Percentage of Children with Any Dental Care		Dental Claims Per Person-Year Enrolled Among Children with Any Dental Care	
	1989	1992	1989	1992
California	20	21	1.5	1.7
Georgia	28	27	2.0	2.0
Michigan	26	26	1.6	1.7
Tennessee	27	29	2.5	2.2

Children with Medicaid-covered dental visits had from 1.5 to 2.5 visits on average in 1989. This changed little over the study period; in 1992, Medicaid children with dental visits had on average 1.7 visits in California and Michigan, 2.0 visits in Georgia, and 2.2 visits in Tennessee.

Table 22. Estimated Impact of OBRA-89 Provisions on the Probability of Any Dental Care and the Number of Dental Claims Among Children with Claims

	Log-Odds Ratio[1]: Probability of Any Dental Care 1992 to 1989			Change in the Number of Dental Claims[2] Among Children With Claims		
	Provider/ Child Ratio	Other Program Changes	Combined Effect	Provider/ Child Ratio	Other Program Changes	Combined Effect
California	0.94	1.05	1.03	0.45	0.96	1.41
Georgia	—	—	—	—	—	—
Michigan	—	—	—	—	0.18	0.18
Tennessee	1.09	1.45	1.59	0.17	—	0.17

[1,2] See footnotes 1 and 2 of Table 13.

Multivariate regression analyses show substantial significant effects of program changes from 1989 to 1992 on the probability of any visits only in Tennessee and on the number of dental visits per child with visits only in California. The ratio of dental providers to enrolled children declined during the study period in all States. Nevertheless, we found significant effects only in California and Tennessee, and these effects were in opposite directions. Furthermore, children who had received any preventive care during the year were significantly more likely to have had dental care, but were just as likely to have had multiple dental visits, except in California where children with preventive care were also more likely to have multiple visits.

4.1.6 Expenditures

Total Medicaid expenditures for the study population in the four study States are shown in Table 23. Recall that the study populations includes all persons under 21 years of age ever enrolled in the Medicaid program who were not covered by Medicare or a Medicaid capitated program and who were not inpatients in long-term care institutions during the study years.

Table 23. Total Medicaid Expenditures for Children and Percentage Change from 1989 to 1992

	1989 (in 1000s)	1992 (in 1000s)	Percentage Change			
			Total	Enroll-ment	Provider Fees	Utilization/ Enollee
California	$1,215,041	$1,937,267	59.4	41.8	0.0	12.4
Georgia	$289,244	$627,514	116.9	66.7	1.6	28.1
Michigan[1]	$370,380	$533,826	44.1	4.5	23.4	11.8
Tennessee	$214,908	$418,293	94.6	46.9	9.9	20.6

[1] Growth in expenditures from Medicaid children in Michigan is lower than actually occurred because of the elimination of children from the study who were enrolled in capitated programs and the significant growth in enrollment in these programs in Michigan during the study period.

In 1989, Medicaid expenditures for medical services among these children totaled $1.2 million in California. Michigan spent 30 percent, Georgia spent 23 percent, and Tennessee spent 17 percent as much as California that year. From 1989 to 1992, total Medicaid expenditures for the study children more than doubled in Georgia and almost doubled in Tennessee. Medicaid expenditures for children grew at somewhat lower rates in California (59 percent) and Michigan (44 percent). In Michigan, the lower growth is partially explained by the increased enrollment in capitated plans among Medicaid children; expenditures for children in capitated plans were not included in these figures.

We broke out the percentage growth in Medicaid expenditures by the growth in enrollment, provider fees, and utilization per enrollee, as shown in Table 23. These data show that in all study States, except Michigan, enrollment growth dominated the growth in expenditures, followed by the growth in service use per enrollee. Georgia had the largest growth in enrollment and utilization per enrollee but among the smallest growth rate for provider fees. In contrast, Michigan had the largest growth in provider fees and the smallest growth in enrollment and utilization per enrollee.

Total Medicaid expenditures for medical services to children are shown in Table 24 both per child enrollee and per person-year enrolled. Average payments per child enrollee in 1989 ranged from a low of $589 in California to a high of $808 in Georgia (Herz et al., 1996b). Medicaid payments per child grew from 1989 to 1992 in all study States. The greatest percentage increase occurred in Michigan where payments per child enrollee rose by more than one third, and the smallest increase was seen in California (12.4 percent). Expenditures per person-year enrolled increased at somewhat lower rates in the four study States because of longer average lengths of Medicaid enrollment among children in 1992 compared to 1989.

Table 24. Medicaid Expenditures Per Child Enrollee and Per Child Person-Year Enrolled and Percentage Change from 1989 to 1992

	Expenditures Per Child Enrollee		% Change	Expenditures Per Person-Year Enrolled		% Change
	1989	1992		1989	1992	
California	$589	$662	12.4	$843	$891	5.7
Georgia	$808	$1,051	30.1	$1,080	$1,356	25.6
Michigan	$620	$855	37.9	$827	$1,115	34.8
Tennessee	$690	$914	32.5	$958	$1,195	24.7

4.2 Comparison of Medicaid to Privately Insured and Uninsured Children

We used a number of national survey databases to compare the health service use and expenditures of Medicaid children to those of insured and uninsured children in low- and middle-to-high-income families. These analyses provide an assessment of the generalizability of the four-state Medicaid claims data analyses and a national context within which to interpret the claims data findings.

4.2.1 Preventive Care Visits

Event-level data were available from the 1987 National Medical Expenditure Survey (NMES) from which we were able to compute preventive care participation and visit rates similar to those computed with the claims data. These rates are shown in Table 25.[14]

We found that Medicaid children had significantly more preventive care visits than uninsured children: 46 percent of children with Medicaid coverage alone had 50 percent of the AAP-recommended visits compared to one third or fewer uninsured children who had only one third of all AAP-recommended visits (Gavin and Bencio, 1996a). Medicaid children also had more visits than privately insured children in low-income families, 40 percent of whom received 43 percent of the AAP-recommended number of visits. These results suggest that Medicaid coverage improved access to preventive care among children with financial barriers.

Table 25. Preventive Care Participation and Visit Rates by Health Insurance and Income Category, 1987 National Medical Expenditures Survey

	Participation Rate[1]	Visit Rate[1]
Medicaid coverage only	46	50
Medicaid and other insurance coverage	50	55
Private coverage and incomes < 200% of the FPL	40	43
Private coverage and incomes ≥ 200% of the FPL	54	62
Uninsured and incomes < 200% of the FPL	29	34
Uninsured and income ≥ 200% of the FPL	33	33

[1] Adjusted for the age-specific AAP periodicity schedule for well-child visits.

In the descriptive analysis, we also found that Medicaid children were significantly less likely to have had any preventive care visits and had significantly fewer preventive care visits than privately insured children in families with moderate to high incomes in 1987. However, in multivariate analysis of the probability that children under six years of age had the AAP-recommended preventive care visits, Medicaid children were as likely as privately insured children in moderate-to-high-income families to have had any visits and, among those with visits, to have had the recommended number of visits. This suggests that the differences found in the descriptive analysis were primarily a result of non-financial barriers. Important non-financial barriers were the education level of the child's mother and whether other young children were also present in the household.

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[14] As noted in footnote 9, the preventive care participation and visit rates computed with the 1987 NMES fell within the range of rates computed with the 1989 claims data for the four study States.

4.2.2 Immunizations

We compared the immunization status of Medicaid children to insured and uninsured children in low-income families and to children in higher income families (virtually all of whom had health insurance) with data from the 1991 and 1992 National Health Interview Survey - Child Health Supplements (NHIS-CHS) (Gavin and Bencio, 1996b). The immunization completion rates for the basic childhood immunization series of four DTP, three OPV, and one MMR for children under six years of age from the 1992 NHIS-CHS are shown in Table 26.[15]

Table 26. Completion Rates[1] for Basic Childhood Immunizations by Health Insurance and Income Category Among Children Under Six Years, 1992 National Health Interview Survey

	Basic Series[2]	Hib[3]	HBV[4]
Medicaid coverage only	52	26	8
Medicaid and other insurance coverage	58	30	4
Incomes ≥ 200% of the FPL	61	33	9
Incomes < 200% of the FPL with insurance	54	26	7
Incomes < 200% of the FPL with no insurance	52	24	7

[1] Adjusted for the age-specific AAP periodicity schedule for well-child visits.
[2] Includes four DTP at ages 2, 4, 6, and 18 months; three OPV at ages 2, 4, and 18 months; and one MMR at age 15 months.
[3] Includes three Hib at 2, 4, and 15 months.
[4] Includes three HBV at birth, 2, and 18 months.

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[15] These rates were in the range of the age-appropriate immunization completion rates found in the Medicaid claims data for the four study States in 1992. However, the two sets of rates differ substantially: the claims data rates represent a on-year time period and five vaccine types (DTP, OPV, MMR, Hib, and HBV) whereas the rates from the national surveys are measured since birth and include only three vaccine types (excluding Hib and HBV).

In contrast to our findings on preventive care visits, children covered only by Medicaid during the year were no more likely than other low-income children to be up-to-date in their basic series of childhood immunizations—only 52-54 percent of children in these groups were up-to-date in the basic series immunizations. A significantly greater percentage of children in higher income families—61 percent—were up-to-date in these immunizations in 1992. Many fewer preschool-aged children in all health insurance and income groups were up-to-date in the Hib and HBV immunizations, but completion rates for these immunizations exhibited similar trends across the groups.

Besides family income, we found several demographic and family characteristics that significantly affected children's immunization status (Gavin and Bencio, 1996b). African-American children were less likely than white children to have completed the basic series of childhood immunizations. Children of higher birth orders were less likely than first-born children; children living in single-parent households were less likely than children in two-parent households; children whose mothers had not obtained high school diplomas were less likely than children whose mothers had graduated from high school; and children whose mothers were working were less likely than those whose mothers were not working to have completed the basic series of childhood immunizations. Because of the prevalence of these characteristics among Medicaid and other low-income children, the results suggest the presence of significant non-financial barriers to care among these children.

4.2.3 Problem Identification, Treatment, and Referral

In a sample of preventive care visits among individuals under 21 years of age in the 1991 National Ambulatory Medical Care Survey, we found that private, office-based physicians were less likely to identify health problems during preventive care office visits for Medicaid patients than were EPSDT providers in Georgia and Michigan in 1989 (Gavin et al., 1996). EPSDT providers in these States were typically physicians and other practitioners working in local public health departments. The differences may arise from the more comprehensive screenings undertaken in the EPSDT visits, the greater reporting requirements for these visits, and/or children with differing health care needs frequenting the two provider types.

In addition, comparing rates of identified health care needs during Medicaid-covered and other visits, we found that physicians were more likely to identify problems during visits paid by sources other than Medicaid than they were during Medicaid-covered visits (30 percent v. 20 percent). The top five health care needs identified for Medicaid children were those related to the ear, the skin, chest/lung, congenital anomalies, and the reproductive system. The same types of problems were most frequently identified for non-Medicaid children, with the exception of congenital anomalies, which were not as prevalent.

4.2.4 Diagnostic and Treatment Services

We used the 1988 and 1991 NHIS core surveys to investigate the relative use of diagnostic and treatment services among Medicaid children, children in middle-to-high-income families, and insured and uninsured children in low-income families and to determine how the patterns in service use among these children may have changed after implementation of OBRA-89 (Gavin and Bencio, 1996b). Data on outpatient physician contacts and hospital episodes are shown in Tables 27 and 28, respectively.[16]

Table 27. Physician Contacts[1] by Health Insurance and Income Category, 1988 and 1991 National Health Interview Surveys

	Percentage With Physician Contacts		Number of Contacts Per Child		Percentage of Contacts in Physicians' Offices	
	1988	1991	1988	1991	1988	1991
Medicaid coverage only	79	84	4.7	5.4	52	56
Medicaid and other insurance coverage	86	89	5.9	4.4	37	43
Incomes ≥ 200% of the FPL	85	85	5.3	6.2	61	65
Incomes < 200% of the FPL with insurance	74	79	3.8	4.0	57	59
Incomes < 200% of the FPL with no insurance	67	66	2.9	2.7	49	50

[1] The 1991 data are age and gender adjusted to match the 1988 child population.

The data in these tables show Medicaid children in 1988 and 1991 had higher numbers of physician contacts and hospitalizations on average compared to other low-income children. In addition, whereas Medicaid children had higher hospital use than children in moderate-to-high-income families, they had fewer outpatient physician contacts. In multivariate analyses of the probability and number of physician contacts during the year, we found that the significant differences between Medicaid children and other low-income children persisted after holding constant children's health status and selected demographic, geographic, and family characteristics, but that the differences between Medicaid children and children in moderate-to-high-income families did not (Gavin and Bencio, 1996b).

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[16] These utilization measures are not comparable to those computed from the claims data and therefore could not be directly compared—e.g., physician contacts include telephone calls along with face-to-face visits, and the Medicaid and other child populations sampled in the national survey include children with managed care coverage who typically have fewer hospitalizations than children with fee-for-service coverage.

Face-to-face visits to physicians' offices were the dominant type of physician contact for children in all health insurance and income groups. However, privately insured children had a higher percentage of these type visits than Medicaid children, who in turn had a higher percentage than uninsured low-income children.

Table 28. Hospital Episodes[1] by Health Insurance and Income Category, 1988 and 1991 National Health Interview Surveys

	Percentage With Hospitalizations		Number of Hospital Days Per 100 Children	
	1988	1991	1988	1991
Medicaid coverage only	8	7	54	48
Medicaid and other insurance coverage	8	6	104	78
Incomes ≥ 200% of the FPL	3	3	20	17
Incomes < 200% of the FPL with insurance	3	4	24	19
Incomes < 200% of the FPL with no insurance	2	4	11	20

[1] The 1991 data are age and gender adjusted to match the 1988 child population.

We also found changes in children's health service use over time. Children with only Medicaid coverage were slightly more likely to contact physicians on an outpatient basis but were slightly less likely to be hospitalized in 1991 compared to 1988. In contrast, uninsured children in low-income families were slightly less likely to have contacted physicians but more likely to have been hospitalized in 1991 compared to 1988. Children in middle-to-high-income families were as likely to have physician contacts and hospitalizations in 1991 as they were in 1988, but they had slightly more physician contacts and fewer total hospital days per child in the later year. A greater percentage of physician contacts among children in all health insurance and income groups were face-to-face visits in physicians' offices.

As in the multivariate regression equations for preventive care visits and immunization status, we found African-American race, the presence of siblings, and low maternal education to lower the probability of any physician contacts and the number of contacts per child with contacts. We also found that children who resided in medium- to large-sized urban areas were more likely to have had any physician contacts than children in rural and small urban areas, and that higher Medicaid fees were significantly associated with a higher probability of physician contacts in 1991, but not in 1988.

4.2.5 Dental Services

Measures of dental care service use among two-to-six-year olds in the 1991 NHIS-CHS by the child's health insurance and income category are shown in Table 29.[17] Medicaid children were significantly more likely to have visited a dentist during the year compared to uninsured, low-income children and slightly less likely than insured, low-income children, but this latter difference was not statistically significant in a multivariate analysis. In addition, Medicaid and other children aged two to six years in low-income families were significantly less likely than children in the higher income group to have visited a dentist. There was little variation in the number of dental visits among children with visits; Medicaid children had a slightly higher number of visits on average, but the difference was not statistically significant.

Table 29. Dental Care Indicators by Health Insurance and Income Category Among Children Aged Two to Six Years, 1991 National Health Interview Survey

	Percentage With Visits	Visits Per Child With Visits
Medicaid coverage only	39	2.0
Medicaid and other insurance coverage	(1)	(1)
Incomes ≥ 200% of the FPL	56	1.7
Incomes < 200% of the FPL with insurance	42	1.7
Incomes < 200% of the FPL with no insurance	32	1.7

[1] The sample size was not large enough for statistically reliable estimates.

Other factors that significantly lowered the probability that children received any dental care were African-American race, higher birth order, and low maternal education. These factors had similar negative effects on all the utilization measures investigated.

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[17] Except for California, we found 36-37 percent of Medicaid children aged three to six years had some dental care during 1992 in the claims data analysis—thus, the percentage of children with dental care was approximately 10 percent higher in the 1991 NHIS-CHS which includes dental care provided outside of the Medicaid program in addition to Medicaid-covered care. Only 23 percent of Medicaid children aged three to six years had any dental care during 1992 in California, where a shortage of dental providers serving Medicaid children prevailed.

4.2.6 Expenditures

Using the 1987 NMES data file, we explored whether health care expenditures among Medicaid children differed from privately insured and uninsured children in different level-of-care categories and whether the influence of family characteristics differed in these categories. The different levels of care were: (1) no care, (2) preventive/dental care only, (3) ambulatory illness-related care with or without preventive/dental care, and (4) inpatient care with or without other care. Infants born during the year were examined separately because they all had some inpatient care.

Table 30. Level of Care and Total Average Health Care Expenditures by Health Insurance and Income Category, 1987 National Medical Expenditures Survey

	Percentage Distribution by Level of Care					Average Total Expenses Per Child
	No Care	Prev./ Dental Only	Other Out-patient	In-patient	Infant	
Medicaid coverage only	21	6	62	7	4	$807
Medicaid and other insurance coverage	12	7	69	6	7	$910
Private coverage and incomes < 200% of FPL	20	5	66	5	4	$749
Private coverage and incomes ≥ 200% of FPL	11	4	77	5	3	$870
Uninsured and incomes < 200% of FPL	42	5	46	5	2	$520
Uninsured and income ≥ 200% of FPL	37	5	53	4	1	$343

Uninsured children, regardless of income, were the most likely to have had no care (37-42 percent) and the least likely to have had any outpatient illness-related care (46-53 percent) in 1987. In contrast, children with private coverage in moderate-to-high-income families were the least likely to have had no care (11 percent) and the most likely to have had illness-related outpatient care (77 percent). Children with Medicaid alone had a similar distribution over the level-of-care categories as did privately insured children in low-income families.

Total average expenditures for Medicaid children in 1987 ($807 for children with Medicaid alone and $910 for children with both Medicaid and other insurance) were significantly higher than those for uninsured children ($520 among children in low-income families and $343 for those in moderate-to-high-income families). However, total average expenditures for Medicaid children were not statistically different from those of privately insured children ($749 for children in low-income families and $870 for children in moderate-to-high-income families).

Except for infants, these findings persisted after controlling for health status and selected enabling and predisposing factors in multivariate analyses. Medicaid coverage, but not the lack of insurance was a significant, negative determinant of total health care expenditures for infants. Infants from low-income families, regardless of insurance coverage, had lower total expenditures compared to infants from higher income families. We also found that African-American race, low maternal education, and the presence of siblings under six years of age significantly reduced health care expenditures among children in 1987.

5 Conclusions

This study addressed numerous questions regarding implementation of OBRA-89 provisions relating to children's Medicaid coverage in four States, the impact of these changes on children's health service use and expenditures under Medicaid in these States, the generalizability of these findings for other States and territories, and the relationship of the levels of health service use and expenditures among Medicaid children to those of privately insured and uninsured children in low and moderate-to-high-income families. Our findings on the key questions addressed are summarized below.

- **How did the four States change their eligibility requirements for children during the study period, and what impact did these changes have on the number and the composition of enrolled children?** The AFDC and medically needy income thresholds for Medicaid eligibility increased slightly from 1989 to 1992 in two of the study States—Georgia and Tennessee. None of the increases kept pace with the increase in the FPL. However, by 1992, all four States had implemented the poverty-related eligibility expansions for children mandated in OBRA-90, and all, except Georgia, also covered infants living in families with incomes up to 185 percent of the FPL. In addition, all States were covering more SSI children because of the Supreme Court order to assess each child for SSA disability against age-appropriate functional standards, and coverage of undocumented aliens under 21 years of age more than doubled in California during the study period.

  From 1989 to 1992, the number of children enrolled in Medicaid who met the study inclusion criteria increased significantly in California (42 percent), Georgia (66 percent), and Tennessee (47 percent), but only a small 4 percent in Michigan. (The small increase in Michigan is partly a result of the increased enrollment in capitated programs in 1992, which disqualified children from this study.) In addition, all four States experienced significant changes in the composition of their Medicaid child population. In 1992, Medicaid children were younger on average, more likely to live in two-parent families and central cities of urban counties, more likely to be disabled, and in three of the study States (all but California) were more likely to be white. These characteristics were found in multivariate analyses to significantly affect children's health care service use and expenditures.

- **How did the four States change provider participation requirements and reimbursement levels, and what impact did these changes have on provider participation and children's access to care?** Each of the study States undertook initiatives to increase providers' willingness to serve children under their Medicaid and EPSDT programs. These initiatives included recruitment activities, reduced administrative burden, training in billing, and increased fees. However, Medicaid fees made headway over private fees for a representative set of services in only two of the States—California and Tennessee—and for a set of preventive care services in a single State—Michigan.

  The States' efforts were successful in increasing provider participation and average caseloads among all types of providers, including physicians, clinics and hospital outpatient departments. One notable exception was the number of participating dental providers serving children in Michigan, which declined 10 percent from 1989 to 1992. However, the increases may not have been adequate to meet the increased demand. The ratios of the number of child Medicaid enrollees to participating physicians and dentists serving children and the percentage of counties with shortages of child health physicians rose from 1989 to 1992 in all four study States. Furthermore, although the concentration of health service provision to children among physicians eased somewhat over the study period, no marked shift to office-based physicians occurred. Institutional providers remained an important source of health care in general and preventive care in particular for Medicaid children in 1992.

- **How did the four States change the provision of preventive care under Medicaid and what impact did these changes have on the percentage of children with any preventive care and the percentage of children in compliance with national standards on preventive care for children?** In response to the 80-percent EPSDT participation target, all the States increased their informing and outreach activities related to EPSDT and preventive care in general. In addition, Michigan changed its periodicity schedule for EPSDT visits to comply with the AAP schedule for well-child visits, officially recognized well-child examinations provided by any participating Medicaid physician as EPSDT visits, and set higher reimbursement levels for EPSDT visits, and California developed a periodicity schedule for dental services.

  The efforts of the study States to increase the use of preventive care among Medicaid children were only moderately successful from 1989 to 1992. Counting all EPSDT and other well-child visits paid by Medicaid, only 43 to 54 percent of children recommended to have had preventive care visits had visits and only 36 to 59 percent of the recommended visits were made. The modest improvement must be interpreted in light of the large increase in Medicaid-enrolled children over this time period and the inability of the medical care system to quickly adjust to absorb the increase in demand. The lowest rates were found in Georgia, which precluded payments for well-child visits outside of EPSDT and had the greatest increase in enrolled children. The highest rates were found in Michigan, which made substantial changes to its EPSDT program during the study period and had the lowest increase in its fee-for-service Medicaid child population.

We also found very low completion rates for age-appropriate immunizations, ranging from a low of 48 percent in Michigan to a high of 61 percent in Georgia in 1992. Although the claims data may miss immunizations received by these children outside of Medicaid during the study period, forms filled out by physicians for children who received EPSDT screening visits suggest these children have a significant backlog of missed immunizations. At the time of their last EPSDT visit, as many as one-fourth of Medicaid children continued to be behind in their immunizations.

In multivariate regression analyses, we found only small negative impacts on the use of preventive care caused by the failure of the supply of primary care physicians to keep up with the demand for preventive care services. Furthermore, we found significant, positive impacts of other program changes. Nevertheless, States must increase their efforts to reach the 80-percent EPSDT participation target.

- **How did the four States change covered services for children in their Medicaid programs, and how did this impact the types of problems for which children were referred for further diagnosis and treatment and the number and types of services children utilized?** The OBRA-89 provision that Medicaid cover any diagnostic or treatment services needed by children for conditions identified during EPSDT screens had very little impact in the study States. In all four States, Medicaid officials indicated that they believed that their programs' coverage of services was very broad and that they did not need to make major changes to the depth or breadth of coverage of children's services in response to the law. However, all four States instituted a medical necessity review process to assess, on a case-by-case basis, whether services beyond those covered by the State plan are needed to treat Medicaid children.

  In an investigation of EPSDT screening forms filled out by physicians in Georgia, we found that the prevalence and types of health care needs among children with EPSDT visits were similar in 1989 and 1992. However, the percentage of these identified health care needs that were either treated or referred for treatment declined over time. These trends are consistent with the more frequent EPSDT visits per child—that is, after an initial referral for a particular problem, the child may have been under care and therefore would not need additional treatment or referral. The differences may also be explained by less severe problems found among the newly eligible expansion children. However, we could not test either of these hypotheses.

  The direct effect of the program changes on the numbers and types of services utilized is difficult to disentangle from other changes in the States and in the medical, social, and economic environment in which the Medicaid programs of the four States operate.

However, we did see small increases in the use of diagnostic and treatment visits and of prescription medications in three of the study States that may be, in part, because of program changes. Furthermore, we found consistent positive effects of preventive care use on all medical and dental utilization measures we investigated, except the number of hospital days.

Of particular concern are the low percentages of Medicaid children with any dental care during the year. We found Medicaid children aged seven to 12 years of age had the highest utilization rates. In 1992, the percentage of children aged seven to 12 years who had received any dental care ranged from 32 percent in California to 44 percent in Tennessee. Multivariate regression analyses show substantial significant effects of program changes from 1989 to 1992 on the probability of any dental visits only in Tennessee and on the number of dental visits per child with visits only in California.

- **How did all of these changes in eligibility, benefits, and provider incentives impact expenditures for Medicaid-covered services among children?** Medicaid expenditures for the study population of children grew precipitously in the four study States from 1989 to 1992—more than doubling in Georgia and almost doubling in Tennessee. In all study States, except Michigan, enrollment was the dominant contributing factor to the growth in Medicaid expenditures for study children. Greater service use per enrollee was the second largest contributor to expenditure growth in all study States. Provider fee increases were a major contributing factor to expenditure growth only in Michigan and to a lesser extent in Tennessee.

- **How did the use of preventive and curative health care services by Medicaid children compare to that of privately insured and uninsured children in low-income and middle-to-high-income families and how did these comparisons change after implementation of the OBRA-89 provisions?** We found that compared to other low-income children, Medicaid coverage increased service use, and perhaps improved access, to at least illness-related care for children. Medicaid children had higher utilization rates of illness-related care than uninsured and privately insured children in low-income families after controlling for children's health status and selected demographic, geographic, and family characteristics. At the same time, we found that differences between Medicaid children and children in moderate-to-high-income families persisted, suggesting that equal access had not been achieved. In addition, multivariate analysis of immunization completion rates and dental care utilization show no significant differences between Medicaid and other low-income children but did show Medicaid children to have a significantly lower likelihood of having visited a dentist and having been up-to-date in the basic immunization series.

  Furthermore, we found other important barriers to care that prevented Medicaid children from utilizing either illness-related or preventive care services at levels significantly higher than other low-income children and/or at levels equal to children in higher income families. The consistent negative impacts found for African-American children and children whose mothers had only a high school education and the disproportionately large percentage of Medicaid eligible children with these characteristics are particularly notable. These results suggest that significant outreach and education programs are needed to achieve equal access to care for these children.

Overall, we found evidence that in 1992 the study States placed a higher priority on improving EPSDT's effectiveness than they did before 1989. Efforts to expand the EPSDT provider base and enhance outreach were either directly or indirectly inspired by OBRA-89. These efforts had significant impacts on the use of both preventive care and diagnostic and treatment services. However, the impacts were somewhat muted by the concurrent increase in the number of children enrolled in Medicaid during the study period. Nevertheless, the program expansions reached newly enrolled children who would have gone without recommended well-child care and needed illness- and disability-related care in the absence of Medicaid coverage. Therefore, the net impact on children's health service use of the Medicaid program changes during the 1989-1992 period was unquestionably positive.

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